REMARKS

At the outset applicants wish to thank the Examiner for indicating allowable claims 9 and 10 and that claims 6-8 would be allowed if re-written in independent form including the limitations of the base and intervening claims. Claims 1-13 are in this case. Claims 1-5 are rejected under 35 U.S.C. §102(e) or in the alternative under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,411,746 to Chamberlain, et al. (hereinafter "Chamberlain").

New claims 11-13 are claims 6-8 rewritten in dependent form. Claim 1 has been amended to emphasize that the capillary tube heater is unslotted.

Claim Rejections - 35 U.S.C. §102(e) (Chamberlain):

It is well established that a claimed invention is anticipated by a prior art patent only if the patent discloses each and every limitation of the claim. In the present case, independent amended claim 1, calls for a thermally tunable optical fiber device comprising a length of optical fiber. It is circumferentially surrounded by an unslotted microcapillary heater. Chamberlain discloses a slotted heater. (Chamberlain, col. 4, lines 60-67). Chamberlain does not disclose an unslotted heater and therefore does not anticipate the instant invention. This rejection is believed inapplicable to claims as amended.

Claim Rejections - 35 U.S.C. §102(e)/ §103 (Chamberlain):

It is well established in order for a reference to make a claimed invention obvious, the reference must teach or suggest every limitation of the claim.

Optical devices, such as tunable Bragg gratings, can be tuned by heat. (Specification, page 2, lines 17-18). The tuning heat can be supplied through ohmic heating by metal layers deposited on the device. Such layers can be tapered and separated by thin film insulators. (Specification, page 3, lines 14-18). But, this method of depositing heater layers can be difficult to reproduce reliably, and it requires multiple production steps and expensive deposition tools. (Specification, page 3, lines 21-24)

The solution to the problem is to fabricate the heaters as unslotted circumferential microcapillary heaters. (Specification, page 4, lines 1-2). The microcapillaries have a small maximum outer diameter of less than 2mm. The small surface area is important because it presents low heat loss. Moreover, the relatively small thermal mass permits a fast tuning response. (Specification, page 5, lines 16-18). An important advantage of the invention is that it can provide a desired temperature versus length profile along the fiber device. (Specification, page 4, lines 9-10).

Chamberlain discloses a slotted tubular heater. The slot extends the entire length of the capillary tube. (Chamberlain, col. 4, lines 66-67). Chamberlain requires the slot to deposit resistive material within the slotted tubular heater. (Chamberlain, col. 5, lines 5-6). By contrast, in the instant invention, the capillary itself can be fabricated from a resistive material, or it can be coated on its outside surface with a resistive material. (Specification, page 5, lines 11-27). The inventive microcapillary heater does not need a slot and is therefore far easier and less costly to produce. Moreover, the presence of the slot in Chamberlain would expose the entire length of the device to ambient gas of substantially the same temperature, interfering with any efforts to control the temperature versus length profile of the device. Thus Chamberlain is inconsistent with the invention. Accordingly this rejection is inapplicable to the claims as amended.

It is believed that this case now fully complies with 35 U.S.C. §102 and 35 U.S.C. §103 and is condition for allowance. Reconsideration and favorable action in this regard are therefore earnestly solicited.

Respectfully submitted,

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AMENDED CLAIMS SHOWING CHANGES

Claim 1:

1. A thermally tunable optical fiber device comprising:

a length of optical fiber including the thermally tunable device; and

circumferentially surrounding the thermally tunable device, an unslotted microcapillary heater for thermally tuning the device, the heater comprising a microcapillary tube having an effective outside diameter of less than about 2 mm and an electrically resistive heater formed on or constituting the tube.

11. A thermally tunable optical fiber device comprising:

a length of optical fiber including the thermally tunable device; and

circumferentially surrounding the thermally tunable device, a microcapillary heater for thermally tuning the device, the heater comprising a microcapillary tube having an effective outside diameter of less than about 2 mm and an electrically resistive heater formed on or constituting the tube, wherein the heater comprises a plurality of resistive coatings angularly spaced apart around the periphery of the tube.

12. The tunable fiber device of claim 11 wherein the tube comprises an electrically resistive material, and the heater comprises the resistive material of the tube.

13. The tunable fiber device of claim 11 further comprising an additional heater on the fiber.